

Disclaimer:

It should be obvious that one needs to have confidence in one's abilities before attempting any modifications to electronic equipment. Do be careful, and any responsibility for disaster is your own.

The Pictures:

- Full internal chassis view, annotated.
 - Processor section, annotated.
 - Processor circuit board, annotated.
 - Processor circuit board, high resolution 1216x787, courtesy of Tom Davidson. This will not stay in full resolution here.
 - Processor circuit board with 1 1/8 in angle heat sink.
 - Position of thermocouple sensor, measurement 130 degrees F with 1 1/8 inch angle heat sink and Apex completely closed up as normal operation, playing DVD.
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The Annotations:

- H1 -- Processor chip area, bent sheet metal forming heat sink
 - H2 -- Digital Audio Converter (DAC) chip area, bent sheet metal forming heat sink
 - M -- Karaoke microphone board audio cable
 - A -- Audio outputs to back panel board
 - V -- Video outputs to back panel board
 - P -- Power supply connection
 - F -- Front panel connection
 - D -- DVD drive connection
 - S -- four screws securing processor board assembly
 - MB -- Karaoke microphone input and mixer board
 - T -- NTSC/PAL Composite output transistor
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DVD Drive -- KoreaDVS DVS-LDR DSL-600A

Chip Notes:

- ROM -- 27C040 or AM29F040B-JC (U4)
- PROC -- ESS ES4308F ESS Technology -- MPEG Decoder/Processor (U1)
- DAC -- ADV76170KSU Analog Devices -- NTSC/PAL Encoder (U9)
- U2,U3 -- M12L1616A-6T ESMT -- SDRAM total 2Mx16
- U5,U6 -- IS61C256AH-15N -- High Speed SRAM 32kx8
- U7 -- 317632J F374 TI
- U8 -- 24C01A Atmel -- 128x8 Serial EEPROM
- U15 -- 27.000 MHz HC04DY -- Crystal Oscillator
- U17 -- YSS903-M Yamaha -- Karaoke Processor 2 for Video Disc Player
- U1 -- PCM1720E Burr Brown -- Stereo Audio DAC MPEG2/AC-3 Compatible

AVK

various sources on the <http://www.nerd-out.com/apex/> message boards.

On the main board (inside the tin can) are the
U1 ES4308F (ESS DVD micro controller)

U2,U3 Elite MT M12L16161 -7T (????), May be an ALI fast cache SRAM
Looks like Cache chips typical on Socket-7 Motherboards,
probably used for ESS MPEG framebuffer

U4 AT27C040 -12PC Atmel (OTP 120nS 512Kx8 ROM)
<http://www.atmel.com/atmel/products/prod90.htm>
Main program ROM

U5,U6 IS61C256AH-15N ISSI (32Kx8 15nS SRAM)
<http://www.issi.com/asyncrams.htm> IS61C256AH
Program RAM, they look like they share the same bus as the ROM

U7 LS374 (TTL latch for ram databus?)

U8 8pin SOIC

U9 ADV7175 (Video encoder - neat chip)

U12 Yamaha YSS903-M (Karaoke chip).

U15 27MHz TTL oscillator

U16 ?

U19 ?

CN1 - Remote and Front Panel

GND

DAT

CLK

CS

IR

VCC

CN2 -IDE

IDE connector to Drive

CN3 -

? Only 1 wire is connected, AGND is open,
Soft Power control?

CN4 - Audio

MUT - MUTE

KAL - Karaoke Left input?
AGD - audio or analog GND?
KAR - Karaoke Right input?
ZER
AOL - Audio out Left?
AGD - audio or analog GND?
AOR - Audio out Right?

CN5 - Power Input

3.6V -
GND -
GND -
VCC -
VAA -
AGND -

CN6 - Component Video out

Courtesy of Tom Davidson.

Heat Sinking Options:

choose one from the following choices:

- Lift metal cover, smear heat sink grease on flat portions of the integral sheet metal heat sinks (areas H1 and H2) and reassemble.
- Leave cover in place, attempt to slide a one inch wide strip of metal formed into an angle under the H1 sheet metal heat sink, after smearing the angle with heat sink compound on the portion that contacts the processor chip.
- Lift metal cover, place one inch wide L shaped angle on processor after smearing heat sink grease on both side of portion of the angle contacting processor, and place a one half inch wide L shaped angle on the DAC after smearing the portion of the angle contacting the DAC with heat sink grease and reassemble.
- Lift metal cover, remove sheet metal from the H1 area, and mount small CPU type heat sink onto the processor chip with heat sink epoxy. Place a one half inch wide L shaped angle on the DAC after smearing the portion of the angle contacting the DAC with heat sink grease and reassemble.

Note that the flimsy metal "fingers" intended to act as heat sinks for the Processor and the video DAC barely make contact with the chips, and are unlikely to make flat, even contact across the chip, if they make contact at all (my first unit the Processor finger seemed to ride above a 1/32 air gap). Heat sink grease is intended on filling the air gaps that result from metal to metal contact, and I would strongly recommend at least the first option listed above.

Links:

- The Main Apex Enthusiasts Web Site, <http://www.nerd-out.com/apex/>
- <http://www.atmel.com/atmel/products/prod90.htm>
- <http://www.issi.com/asynccrams.htm>

- IS61C256AH
 - AD-600A Information Gathering page, another modification aimed site, <http://members.uss.net/~orn/tech/ad600a/>
 - List of ROM Flavors.
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Future Additions:

- low pass filter on Composite Video Output
 - Modify Microphone Input board for Headphone output.
 - Additional power supply bypassing and RF supression.
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Thanks to Paul Ravitsky for the original photos and all his useful help and advice.

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